CONTRIBUTION OF FISHING TO HOUSEHOLDS' ECONOMY - EVIDENCE FROM FISHER-FARMER COMMUNITIES IN CONGO*

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ABSTRACT

Small-scale fisheries in developing countries have often been perceived as a low-productivity, backward informal sector. As a result they are rarely considered as a possible entry point in poverty reduction and rural development planning. Data collected in Democratic Republic of Congo show that this perception may not reflect the empirical reality. Through group and individual household interviews we investigate the dual role of fish as food and cash-crop in this very remote rural area of Congo. The data show that - like in a majority of inland fisheries- fishing is operated seasonally as part of a household-based multi-activity livelihood strategy. Analysis shows that the poorest households rely more heavily on fishing for their supply of protein-rich food, in particular through the fish caught by women. Fishing also appears to be the main source of cash income for the majority of the households, including farmers. In fact households which have the opportunity to engage in fishing often display a higher income than non-fishing households. Based on these findings the paper argues that small-scale fisheries can play a fundamental role in local economy, especially in remote rural areas where they can contribute to strengthen the livelihoods of people through both food security and cash-income generation.

Keywords: Small-Scale Fisheries; Income-Generating Activity; Rural Poverty; Livelihood Analysis

INTRODUCTION

Small-scale fisheries are seldom considered or included in rural development planning. Recent analyses show for instance that they are only marginally included in PRSPs [1] and, apart from a few exceptions (e.g. [2]) they are frequently ignored in the current debate on rural economy, pro-poor growth and economic development. Several reasons can be put forward to explain this situation. One is the dearth of reliable data and scientific literature available on these fisheries. The majority of coastal or freshwater fisheries are small-scale, spatially diffuse activities, and a significant part of their production is not commercialized or is marketed through informal channels -thus not properly reflected in national economic statistics. In fact, these artisanal fisheries are often perceived as a stagnant, low-productivity and 'residual' sector [3,4]. As a consequence, the conventional discourse is that small-scale fisheries and rural poverty are intimately correlated [5]. This view, which is 'embodied' in the two famous adages "fishermen are the poorest of the poor" and "fishing is the activity of last resort" (e.g. [6,7,8]), strongly conveys the idea of a structural, chronic (or even persisting) poverty affecting fishing communities.

This particular view has, however, been recently disputed by several authors [9,10] who argue that fisherfolks are not necessarily the poorest households in rural areas, and that small-scale fisheries, if recognized and supported by adequate policies, can actually play a significant role as an engine for rural development, especially in remote areas where other economic opportunities are scarce [11,12]. Unfortunately very little empirical evidence exists to substantiate these statements for reasons already

explained above: fisherfolks, in particular inland fishing communities, are notoriously marginalized in national statistics, especially in developing countries.

Within this overall context, the aim of this paper is to provide greater evidence of the contribution of small-scale fisheries to the livelihood and local economy of populations living in remote rural areas. For this, we present socio-economic data that were collected through a detailed household survey completed in the region of Salonga National Park in the central forests or "cuvette centrale" of the Democratic Republic of Congo (DRC). In that region a large number of farming households engage in seasonal fishing activities as part of their diversified livelihood strategy. Our objective is to better document and quantify the role that these fishing activities play in the household's economy, and in particular to investigate the relative importance of this informal sector as a source of cash-income for these populations.

GEOGRAPHIC ECONOMY OF THE SALONGA AREA

The Salonga area is located at the intersection of 4 provinces – Equateur, Bandundu, Kasai Occidental and Kasai Oriental - at the 'heart' of the central basin of the Congo river, in DRC (Fig.1). The region is mostly covered by tropical humid forest and drained by a rich network of rivers and their tributaries. The population of the Salonga area was estimated to be 105,000 inhabitants in 2003, making it one of the less densely inhabited regions of the country.

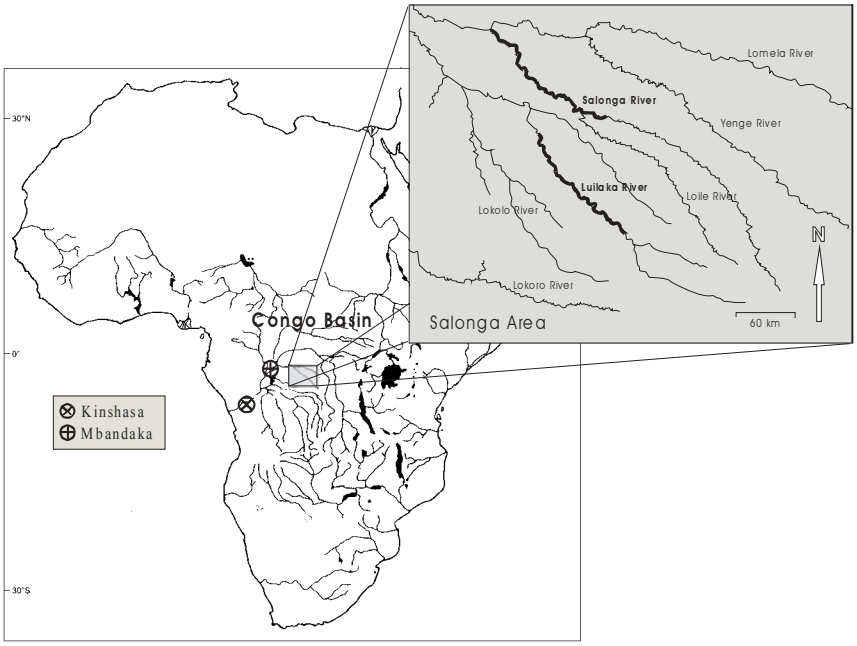

Fig.1. Map of the Salonga area within the Congo Basin. The thick lines in the local map indicate the segments of the rivers that were sampled during the survey.

The whole region suffers a complete absence of basic infrastructure. There is no electricity and the shortage of health care is acute. The area is also enduring severe geographical and economic isolation resulting from the continuous deterioration of the remaining road network and from a total lack of communication with the rest of the country (no phone lines and no mobile phone network for the entire area). The situation was made worse after the outbreak of armed conflicts in the late 1990s, leading to the total interruption of the river transportation system which used to connect the area to the provincial main city (Mbandaka) and to Kinshasa by 'baleinières' (large freight boats).

The local economy largely reflects these infrastructure and social conditions. The demand for farming labor has totally collapsed after the large exploitation units (palm-oil, cacao, coffee, rubber plantations) which provided the main source of waged-labor in the region shut down after the 1973 reforms ('Zaïrianisation'). The cessation of these economic activities, coupled with the decline in supply of manufactured and essential products contributed to reduced trade, exacerbating further the geographical isolation of the area. This combination of factors led the local economy to gradually revert back to a trade system mainly based on barter, local exchange and agricultural subsistence.

Today the Salonga area can only be reached by private plane (2.5 hours from Kinshasa or 1.5 hours from Mbandaka) or by small boats after several days of navigation. Within the area, access to market towns is only possible through water transportation, relying essentially on dugout canoes, pirogues and rafts which are for the majority non-motorized. It takes 10 to 14 days to paddle downstream to Mbandaka and 3 to 4 weeks to paddle back upstream. People engage in this long and dangerous trip only 2 to 3 times a year, usually to sell crops, bushmeat or (dried) fish and to purchase in return basic necessity and manufactured products.

In this harsh context, most household have reverted to traditional subsistence agriculture. Cassava is the main staple food and is consumed in different forms, *chikwangue*, *fufu* or *malemba*. The other main crops are maize, rice, groundnuts, and plantains. The large majority of households engage in mixed-cropping systems on the same plots. In combination with these activities, households also engage in non-farming activities. In particular, commercial fishing and hunting, which can generate daily cash-income have now become economic alternatives to compensate for the collapse of the large-scale plantations and the loss of access to urban markets (when merchants traveled in the area to buy crops, particularly when the transport systems were still functioning).

In contrast with hunting activities, which are practiced only by men, fishing and farming involve both male and female household members. As such, fishing is relatively strongly gender-differentiated: men engage individually in fishing, using mainly passive gears (e.g. hooks and gillnets) on the main river channels while women fish collectively using a traditional method[a] (referred as 'écopage' in Congolese French) using basket-traps called *eboko*. Fishing is not practised all year round with the same intensity. The main fishing periods are the 'short and 'long' dry seasons (respectively January to March, and July to September), although a few households also engage in fishing during the rainy season (October - December). In this case, this involves only men as women's *eboko* cannot be operated during the flooding season.

In addition to the local population who operate from their villages nearby rivers, migrant fishers originating from other parts of the country come to the area to fish. They live in temporary fishing camps along the main rivers where they stay for several months (usually for both the small and long dry seasons) accompanied with their family, practicing both river fishing and écopage.

METHODOLOGY AND DATA

For this research, 519 km of riverbanks were sampled during June and July 2006 along two of the main rivers of the area: 220 km along the Luilaka River and 299 km along the Salonga River (Fig.1). Along these 519 km, 104 fishing camps and landing sites were counted of which 43 were surveyed randomly (41% of the total number). At these sites, 17 focus-groups were organized following standard rapid rural appraisal techniques to generate background information about the social, economic and institutional characteristic of the groups and the seasonal organization of the farming and fishing activities; and 74 random individual interviews of fishers, plus an additional 14 interviews targeting specifically women

engaged in écopage fishing. The interviews were conducted in Lingala (the local language), or in Congolese French, according to the interviewee's preference.

Estimates of income over the 12-month period preceding the survey were obtained through the individual interviews. For fish products which can be sold/exchanged either fresh on a daily basis or processed (smoked) on a more irregular basis, estimate of the total catch over the last fishing season (approximately 3 months) was made through in-depth discussion and extrapolated to the whole year after adjustment for catch yield seasonality. These seasonal adjustment coefficients were estimated during the focal groups and triangulated during individual interviews. Estimates of the fish self-consumed and/or exchanged through barter were obtained through the same approach. As far as farming products are concerned, only cash-incomes derived from marketed crops were estimated and included in the income computation, not the value of the farming products consumed by the households as part of their subsistence. Therefore, to avoid underestimating the real contribution of farming products, only cash-income figures were used whenever farming and fishing activities were compared against each other (i.e. in these cases, the fish income figures were not adjusted for fish home-consumption and barter).

Additional information collected through the socio-economic component of the questionnaire included household composition and size, in-house husband-wife-child division of fishing-related activities (capture, processing, and trading) and other main housing tasks carried out in the fishing camp. Finally information about the originating village of the households (size, proportion of households engaged in fishing activities, distance and time to travel from the fishing camp) were recorded. Based on this last information, the households were divided into two groups. Households originating from villages from more than seven walking or paddling hours (i.e. one full-day of travel) were considered non-local and categorized as "new comers" -in reference to the Congolese French name ("les venants") used by the local population to designated them-, while households originating from villages less than one-day travel were considered 'resident'.

SOCIO-ECONOMIC PROFILE OF THE FISHING COMMUNITIES

Overall 47% of the households surveyed along the rivers were 'new comers', most of them from the same region (other villages and larger towns such as the regional capital Mbandaka), with only few originating from the further provinces. For the vast majority of the households surveyed (both resident and new comers), fishing is considered as a 'regular' component of their livelihood strategy as 87% declare that they fish "every year". However it seems that this strategy is more widely adopted amongst the new comers (95%) than the residents (79%).

The data confirm that fishing is a 'family business' involving the (male) head of the household, his wife and their children, essentially during the two dry seasons (January-March and July September). The totality of the men present in these camps engage in fishing. The situation of the women is more complex. As expected, a majority of them (68%) engage in the collective écopage activity during the short and long dry seasons. A more in-depth analysis reveals, however, that along the Salonga River an increasing percentage of women (29% on average and 50% amongst the new comers) engage in river-fishing and not in écopage any longer.

Broadly speaking, the organization and allocation of labor in the different activities operated in the camps are characterized by a certain degree of differentiation between men and women. Men are for the most part responsible for the wood collection (85%) and the construction and maintenance of the camp, and to a lesser extent for the fish processing (42%). These processing tasks (smoking, salting) are usually supervised by women -90% of them responding that they engage in these activities, along with the other 'conventional' housing tasks (cooking and looking after the youngest children). Sixty percent of women also take part in wood collection. In camps where children are present, these children participate in the

fishing activities in a way that reproduces the gendered pattern described above: young girls participate in the écopage activity while young boy help their father and older brothers in fishing on the main river channel. Neither girls nor boys, however, participate in the fish processing activities which remain under the exclusive responsibility of the parents.

All households use smoking technique to process their catch, and only 11% use salting techniques[b]. Catches are usually stored and sold in different assortments[c]. In addition to the fish processed for commercialization, households also keep a part of their catch for home-consumption -fresh for the immediate consumption during the fishing season or smoked for later consumption.

FISH SUBSISTENCE, GENDER AND POVERTY

The gender-separation of household tasks also applies to the utilization of the catch and in particular their commercialization: while almost all men (98.6%) sell at least part of their catch, only 69% of the women do the same with their own catch. The rest is used for household-consumption (Table 1). Discussions with individual women and during the focus groups indicate that while this écopage is operated in group, the catch obtained during this 'collective' fishing is then handled individually –no 'sharing' or 'redistribution' processes seem to occur among the members of the group. While the fish caught by these women are smaller and the quantities proportionally lower than those caught by men in the main river channel, the data indicate that a statistically larger share of these small fish is kept for house consumption: on average 60% of the catches that women make are kept for house consumption (Fig.2). This is statistically higher than the 27% rate declared by men ($F_{(1,49)} = 38.96$, $P < 0.001$). Overall, households consume 35% of their total captures. In some cases, however, part of the catch is also exchanged for other goods through barter. This type of exchange can involve men or women, 38% and 37% respectively, but overall it represents only 7% of the men's catch volume and 3% of women' *eboko* catch (Table 1).

Table 1. Estimates of the different proportions of catch sold, self-consumed and bartered by the fishing communities of the Salonga and Luilaka rivers

	Men (river fishing)	Women (écopage)	Household
Percentages of individuals selling part of, or all their catch	98.6%	69%	
Proportion of catch sold[1]	71%	30%	
Proportion of catch kept for self-consumption[1]			35%
Percent of individuals who engage in barter	38%	37%	
Proportion of catch barthered[1]	7%	3%	

Note 1: Figures obtained during interviews and based on individuals' own estimations

We further investigated the rate of self-consumption for the fish caught by men in relation to the total level of cash-income of the households. The objective was to determine whether poor households keep a higher proportion of their own catch than the better off households (as it is usually observed for other agricultural commodities), or whether the cash-crop role of fish can reverse this relation, leading poorer households to sell a larger part of their catch.

When disaggregated by quartile, the data reveals a positive trend between self-consumption and income poverty (Fig.2). In the lowest quartile (Q1), households consume on average 33% of their catch, while only 23% in both Q2 and Q3 quartiles and 20 % the highest quartile Q4. An analysis of variance and a pairwise multiple comparison (not shown) confirm the statistical difference of the first quartile Q1 ($F_{(3,37)} = 3.07$; $P = 0.039$). This means that the poorest households (in income-terms) consumed a greater proportion of their catch.

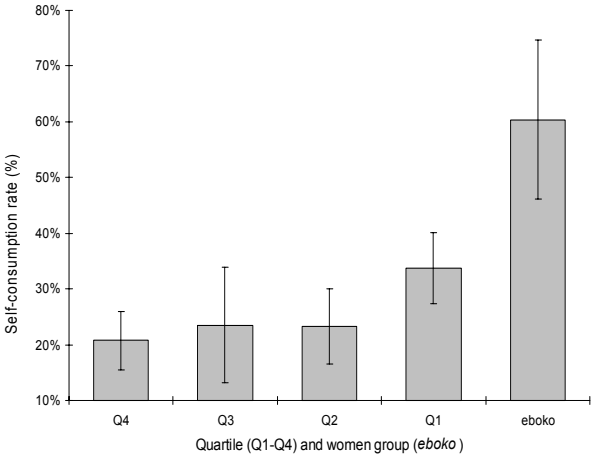

Fig.2. Rate of fish self-consumption for the four income quartiles (Q1-Q4) and for the fish caught by women (*eboko*). Q1 = lowest quartile; Q4 = highest quartile. [error bars = 95% CI].

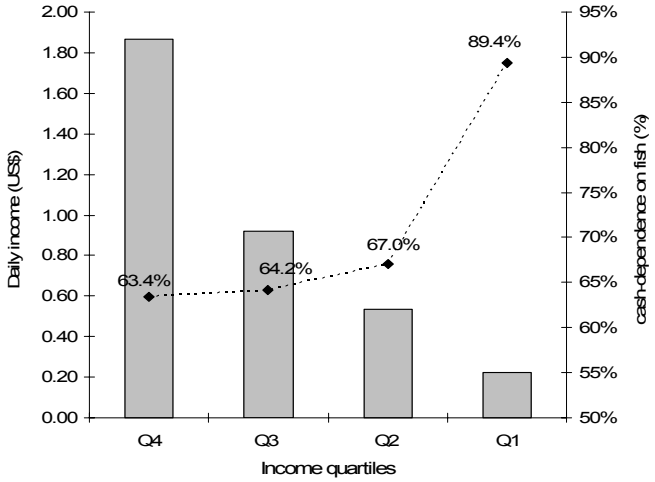

Fig.3. Percentage contribution of fishing activity to total cash-income for the households ranked per quartiles Q1 = lowest quartile; Q4 = highest quartile.

CONTRIBUTION OF FISHING TO THE HOUSEHOLD CASH-ECONOMY

Based on our data the estimated average household cash-income is US$ 0.89 per day, reflecting the level of severe income-poverty that characterises the entire area. After adjustment for fish self-consumption and barter, the average household income is US$ 1.19 per day, i.e. US$ 434 per year. This figure, however, does not include the market value of the farming products self-consumed by the household (subsistence).

Only a minority (10.7%) of the households surveyed are engaged in fishing as a full-time activity. In effect, the vast majority of them are engaged in both farming and fishing, complemented by non-timber forest products (NTFPs), hunting and in some cases by non-farm activities (e.g. petty trade). Not all these activities however generate cash-income, as a large part of the farming activities are based on subsistence. In fact, more than 13% of the households do not derive any revenue at all from their non-fishing activities, and for an even larger proportion (29.7%), fishing represents the only source of cash-income[d]. When we consider the group of households engaged in multi-activities –which includes 89.3% of the whole sample- fishing represents 61% of the average cash-income of this group.

Fishing as the main source of income

Overall, households generate 65% of their total cash income through fishing. This aggregate figure masks, however, some important variations. When households are grouped per income quartile, a negative relation emerges between the contribution of fishing and the household total cash-income (Fig.3). While the households of the lowest quartile (Q1) derive almost 90% of their cash income from fishing, this proportion decreases to 67%, 64% and 63% for the second, third and fourth quartiles, respectively. This trend is confirmed statistically through an analysis of variance on ranks ($H_{(3)} = 13.3$, $P = 0.004$). A pairwise multiple comparison procedure isolates the lowest quartile Q1 as being statistically different from the three other quartiles.

This relationship between fishing income and total cash-income highlights the importance of fishing as a primary source of income for rural households. It also highlights that this role increases for lower-income groups. The poorer the households, the more they rely on fish as a source of cash.

Unpacking the relation between fishing and cash-income

First, we investigated whether household cash-income is related to the degree of engagement in fishing activity, in other terms whether fishing influences the level of total income. For this, household income data were reorganised into four groups according to the importance of fish as a source of cash. First, amongst the 29.7% of households who depend exclusively on fishing as their source of income, two groups were distinguished: the full-time fishers ('specialists') who are not engaged in any other activity, and the 'generalists' who derive the totality of their income from fishing but are also engaged in other subsistence activities. The third group was constituted by the 'fishing-farming' households, that is, the households who are engaged in multiple activities and whose cash-dependence on fish was at least half of their total income. The last group ('farming-fishing') included the households who were engaged in a multiple activity livelihoods and who derived less than half of their cash income from fish.

Considered in this order, the four groups display a decreasing gradient of engagement in fishing. We then computed the average and variance of the household cash-income for each of the four groups. The data indicates that full-time specialists have a higher cash-income than the fishers-generalists, but not higher than the fishing-farming or the farming-fishing households. In turn, the fishers-generalists have a lower cash-income than the three other groups. These results were confirmed statistically (Table 2). The differences in cash-income between the fishers-generalists and the three other groups are significant, but not the differences between fishers-specialists and the two other farming groups (fishing-farming and farming-fishing households).

Table 2. Pairwise multiple comparison of cash-incomes for the fishers-specialists and fishers-generalists versus farming-fishing and fishing-farming households (one-way analysis of variance).

Comparison (N × N)	d.f.	Test	*F*	*P*
generalists vs specialists (13 × 9)	1,21	ANOVA	$F = 5.95$	$P = 0.02$
generalists vs fishing-farming (13 × 36)	1,48	ANOVA	$F = 12.06$	$P < 0.001$
generalists vs farming-fishing (13 × 16)	1,28	Kruskal-Wallis	$H = 7.88$	$P = 0.005$
specialists vs fishing-farming (9 × 36)	1,44	Kruskal-Wallis	$H = 0.29$	$P = 0.59$
specialists vs farming-fishing (9 × 16)	1,24	ANOVA	$F = 0.708$	$P = 0.41$

Secondly, the distinctions between residents and new comers and between Salonga and Luilaka were considered. The analysis reveals no statistical difference between the incomes of the residents and new comers (respectively US$ 208 and US$ 218 -Table 3). In contrast, the difference in incomes based on the river origin is more noticeable (Luilaka: US$ 197, Salonga: US$ 271). Similarly, the revenue derived from the other activities is also substantially different: US$ 137 on the Luilaka against US$ 27 on the Salonga. In short, 91% of the revenue generated by the households operating on the Salonga is derived from fishing, while only 59% along the Luilaka. This difference is partially explained by the relatively high number of Salonga fishers for whom fishing is the only source of income: 70%, amongst which a majority are new comers (58%). Incidentally, the households in this group also appear to be also

extremely 'efficient' since the data show that their fishing revenue is US$ 332 per household per year (Table 3). In comparison, the residents of the Salonga derive only US$ 183 per year from fishing[e].

Table 3. Comparative analysis of household cash-incomes generated by fishing and other activities for households operating along the Salonga and Luilaka rivers -revenues in US$ per household per year (percentage of the total revenues between brackets).

	aggregated revenues (Luilaka + Salonga)		disaggregated revenues Luilaka		Salonga	
Fishing	214 (65%)		197 (59%)		271 (91%)	
Other activities	112 (35%)		137 (41%)		27 (9%)	
Total (fishing + others)	326		334		298	
	residents	new comers	residents	new comers	residents	new comers
Fishing	208***	218***	214***	148**	183 *NS*	332**
Other activities	107	116	128	179	27	26
Total (fishing + others)	315	336	341	328	210	359

Note: *** denotes a significant difference between fishing revenues and other activities' revenues with a probability $P < 0.01$, ** denote a difference with a probability $P < 0.05$; *NS* = non-significant

In sum, the results from this last analysis highlight two main points. One, for the majority of the households, the revenues derived from fishing activities is substantially higher than that derived from all the other aggregated activities. This is confirmed statistically for three of the four groups (Table 3), the exception being the group of the Luilaka new comers for whom the fishing revenue is higher (but not significantly) than the revenues of the other activities. This finding holds also for the two aggregated groups of new comers and residents: households in these two groups derive a higher proportion of their income form fishing than from all cumulated non-fishing activities. Two, a certain number of new comers who operate along the Salonga have specialised in fishing and derive substantially (but not statistically) higher revenue from their fishing than the three other groups. As a result, these specialists are the households with the highest total revenue (fishing + other activities) (US$ 359 per year per household). Taking into account subsistence and barter, their total income per year is US$ 468.

DISCUSSION AND CONCLUSIONS

The objective of this paper was to document and better quantify the contribution of small-scale fisheries to the economy and livelihood of households living in remote rural areas by investigating the dual role of fish as a food and cash crop.

Fish as a food-crop

To improve our understanding of the contribution of fish as a source of food and the potential links that this contribution has to food security we analyzed the share of fish catch that is used by households for home-consumption (as opposed to the proportion that is sold) and related this to income level. Conventionally, it is assumed that in a subsistence-based economy, the poorest households keep a larger share of their own production for home-consumption. It could, however, be argued that since fish is not only a food-crop but also plays a role of cash-crop, the relationship may be reverted as the poorest households are forced to sell a larger proportion of their catch to purchase other, cheaper staple-food. This strategy is what was observed for instance on some parts of the shores of the Lake Chad in areas where population face chronic food shortage. In this case, the poorest groups were observed to sell a higher proportion of these catch than the better-off households. In contrast, in areas where the local populations faced only seasonal food shortage, the more conventional pattern observed for other crops also applied for fish: the poorest households were observed to keep a larger share of their fish catch [13, p.31].

Our data indicate that in the case of the Salonga area the conventional pattern seems to apply. The proportion of fish kept for home-consumption is higher for the income-poor than it is for the better-off households. This finding suggests that the Salonga households do not use their catch to purchase cheaper food. This hypothesis was confirmed by the data (Salonga survey, unpublished data). Irrespective of income level, expenditure pattern show that households allocate on average only 4% of their total budget to food purchase, thus suggesting that their own farming production is sufficient to satisfy their food needs.

A second aspect of this food security issue relates to the gender-dimension of the fishing and fish processing and the potential impact that this phenomenon may have on food and nutritional security at household level. The analysis shows that while more than 98% of men sell part of their catch, only 69% of women do the same with their catch. Furthermore 60% of the (mostly small) fish caught during the écopage are kept for home consumption. While no detailed nutritional analysis was performed, it is likely that this combination of factors (small fish, high proportion of self-consumption) may have important implications for nutritional security. Results from other part of the world where inland fisheries are also predominant (e.g. Bangladesh) have shown that smaller fish are nutritionally richer than larger fish, and more evenly shared among family members than larger fish or meat products [14]. It might therefore be that the few baskets of small fish caught every day by the Salonga women with their 'rudimentary' *eboko* play a disproportional role in the nutritional security of the household members.

The increasing commercialization of fish to respond to the collapse of the other income-generating activities may have, however, started to affect the role subsistence fishing plays in the supply of protein and nutrient-rich foods at the household level for these populations. For instance the fact that an increasing number of women along the Salonga now engage in river-fishing and no longer in écopage may be the result of this search for more cash-income.

Fish as a cash crop

A large part of our research was aimed at assessing the role of fishing as a source of cash. The most direct evidence of this role is the fact that for the majority of households sampled in this survey, the revenues derived from fishing activities are considerably higher than those derived from all other activities combined. This result is not simply an artifact of our sampling since fishing still represents 61% of total cash-income even when we account only for the households who engage in multiple-activities, i.e. when full-time fishers are not accounted for. In other terms, even for households for which fishing is only a seasonal or a part-time activity, this activity generates a large proportion of their total cash-income. In fact, for 75% of the households which are not full-time fishers, fishing represents more than 50% of their cash-income. Fishing may even represent the only source of cash for households who have adopted a multi-activity livelihood strategy. In our case, 59% of the households who depend exclusively on fishing as their source of cash are not full-time fishers but fishers 'generalists' engaged in several activities.

This critical role as an income-generating activity[f] is not surprising as fishing along rivers, although seasonal, can be operated all year round, thus offering the capacity to generate revenues on an almost daily basis. This is a major advantage over a large number of other agricultural activities, particularly crops (manioc, maize, rice, plantain, sweet potatoes) that generate cash only in discretized occasions, essentially once crops have been harvested. Similarly, other traditional activities such as NTFPs are also known to generate only small amount of cash ([15,16,17]. In this context, fishing plays a critical role as a 'bank in the water' for the local population that largely relies on this activity to generate cash quickly and purchase necessary goods and services (including food, basic necessities and health expenses), but also to buy inputs for fishing and other agricultural activities. Although this specific function could not be fully documented in the case of the fisher-farmers community studied in this paper (due to the difficulty to

estimate how exactly households re-allocate their different sources of income into different types expenses[g]), the fact that a large part of their total income is generated through fish selling suggests that fishing activity does indeed play a critical role in the overall household economy. In other part of the world the few other studies which investigate fisherfolk household economy confirm this observation. Along the western shores of Lake Chad for instance, Neiland et al. [18] using individual household income data, show that the better-off households use a large part of the income generated through their fish catch to invest in more efficient or larger fishing gears or even to purchase farming inputs (fertilizers, seeds, etc.) or hire farming labor. This capacity to generate cash surplus at critical period in the season (e.g. the sowing season) to re-invest in the farm economy is essential as it creates a synergy between the inputs and outputs of different activities[h], thus enhancing capital accumulation and income opportunities.

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ENDNOTES

[a] This consists of blocking small tributaries and ponds bordering the main channels and then 'scooping' them using traditional baskets called *eboko*.
[b] A larger proportion of the individuals surveyed (29%) declare however that they do not use this later technique, not by choice but because they lack regular access to salt.
[c] These assortments are designated by different French Congolese names which reflect their relative sizes. In reality, for a same assortment, the number of fish can vary considerably, inducing important unit price variations. The value of these assortments also depends on the species they contain. This system does not allow a systematic estimation of the fish price, even if the (imperfect) pricing mechanisms do clearly respond to micro-economic principles –as attested by the fact that prices at landing sites are approximately 30% lower than those proposed in the distant urban markets where they are also sold such as Mbandaka.
[d] The difference between the two figures comes from the fact that 11% of the households are full-time fishers and are not included in the calculation of the proportion of households who do not derive any revenue from non-fishing activities.
[e] This 'efficiency' also probably reflects the fact that new-comers have a greater access to markets and fishing material than residents
[f] Other elements, although perhaps less direct, also tend to confirm this finding. For instance the fact that a relatively large number of individuals engage in barter transactions but only for a very limited quantity of their catch (7% for men and 3% for women) suggests that households try to minimize the quantity of fish exchanged through this type of transaction, possibly to maximize the revenue they derive through cash transaction from the rest of their catch.
[g] It is for instance extremely difficult for household to know exactly how much of the cash that is generated through, say, the sell of bags of maize is used to purchase other farming inputs or alternatively how much of the cash generated through fish is used to pay to cover health or new fishing gear.
[h] Neiland et al. (1997) for instance found that the level of farm productivity of farmers engaged in seasonal fishing was greater or similar to that of non-fishing farmers.